AGRICULTURAL DEPARTMENT.

J. P. STELLE, EDITOR.

PUBLISHER'S NOTICE—All communications intended for this department should be addressed to PROF. J. P. STELLE, Fort Worth, Tex.

ON KILLING THE COTTON WORM.

It may be regarded as a little soon in the season to begin talking about the cotton worm, though it is always considered better to be a little too soon than a little too late. It is seldom too soon for drawing one's plans and getting things in shape for an important work to follow, and on this plea we bring up the subject to-day, hoping to give everybody time for laying such plans as will save his cotton from that usually disastrous pest the cotton worm.

In 1872 the the late Capt. Isaac Donovan, then a small cotton planter in Mobile county, Ala., came to us with the information that worms had appeared on his crop. He wanted a remedy for the trouble. We knew of none, but suggested that since Paris green was being successfully employed against the Colorado potato beetle at the North the probability existed that the same thing might work equally as well against the cotton worm. The idea struck him with favor, and obtaining a supply of Paris green he prepared it after the potato beetle formula and used it on his cotton. It proved entirely effectual. We gave an account of his experiment through the public press, and from this beginning sprung the present extensive employment of arsenical poisoning for saving the cotton crop.

In 1880 we were employed as a special agent on the United States entomological commission, and placed in charge of the cotton worm investigation for Texas. The following, made up from our report of that work as rendered to the commission, embodies our experience in the employment of arsenical poisons on the cotton fields of the Lone Star state.

It has heretofore been published that

LONDON PURPLE

suspended in water at the rate of half a pound of the former to forty gallons of the latter, and sprinkled over the cotton plants would prove entirely effectual as a remedy for destroying the cotton worm. In the hands of the professional scientist so small a proportion of the poison might be made to answer every purpose, but our experience and observations have settled us in the conviction that half a pound to forty gallons makes a preparation too weak for general use among planters, especially with the rude means now commonly employed for putting it upon the plants. Three-fourths of a pound to forty gallons of water makes a mixture sufficiently weak for all practical purposes, presuming that the London purple is of the very best quality; otherwise it would be too weak. A thorough application of the mixture so proportioned will destroy the worms, and if well and evenly thrown over the plants will not injure them—in fact, one pound of the poison to forty gallons of water will work no injury to the plants worth naming if kept well stirred up in the water and thrown finely and evenly over the cotton.

We do not know what London purple is now selling at in the cotton regions, but suppose it must be ranging at figures somewhere between 5 and 10 cents a pound, which is bringing the cost of cotton worm poison pretty low, you see. Undoubtedly it is a good poison. The strongest objection that can be urged against it is its color. It is a reddish or purplish powder, and being very fine is not decidedly nice to handle, as a matter of course. But it does not stain the cotton which happens to be open at the time of making the application—no complaints have ever been made in that particular.

In every test made we had fine success with London purple where we used so much as three-fourths of a pound to forty gallons of water. At the time referred to London purple was comparatively new as an insecticide, consequently we worked it more thoroughly than we did

PARIS GREEN,

our operations with the latter being confined to a few applications made with the poison suspended in water, for the purpose of determining how small a quantity could be made effectual as a destroyer of the cotton worm. The poison was obtained of a dealer in Galveston, and was supposed to be as pure as any on the general market. It gave entire satisfaction mixed in the proportion of one pound of Paris green to forty gallons of water, and thrown over the plants promiscuously with a force pump in finely divided jets; but less than one pound to forty gallons did not prove a decided success. This quantity entirely cleared off the worms, and did not seem to injure the plants in the least. We added neither starch nor flour, but to one application we added common salt in the proportion of two pounds to forty gallons of the water and Paris green mixture. The salt gave a greater specific gravity to the water, thus as we thought, aiding in the suspension of the Paris green.

But the trouble with Paris green as a cotton worm poison lies under two heads; (1), its great cost compared to that of other poisons, and, (2), the liability to which one is exposed of getting an adulterated and inferior article. It will not do to risk applying a worthless poison when one's plantation has been attacked by the cotton worm, for a misstep made at that time could not be retaken and corrected—the cotton would be used up before a second application could be made after learning that the first was a failure.

We may add that the original method of applying Paris green as an insecticide was mixed with some kind of dry substance, as flour, slacked lime, etc. At the time of our experimentation in Texas that method had been pretty generally discarded for the water-suspension method. Of late years entomologists seem to have gone back to first principles, and are now recommending the application of both Paris green and London purple in the dry state, mixed with some suitable adulterant. For ordinary low cotton the dry mixture is probably all well enough, but for the large growing cotton in Texas it will scarcely do—you could not get the mixture well through the heavy foliage of the plants. On this account we still favor the old plan of suspension in water.

It is doubtless well understood that neither London purple or Paris green are soluable in water, therefore, a constant agitation is necessary at the application, to prevent the poison from settling to the bottom of the vessel.

In our Texas work we experimented largely with pure

ARSENIC

and the results gave us much satisfaction. The arsenic employed by us was the common white article, costing by the barrel at that time, landed in Texas, from 3 to 4 cents per pound. A permanent solution was made by adding to five gallons of water five pounds of arsenic and one pound of sal soda, and then boiling over a fire, in a common iron pot, until all the arsenic was dissolved. This makes a solution of arsenic that will keep for any length of time without the slightest precipitation. We have since learned that the common caustic soda or "concentrated lye" will answer the purpose equally as well as the sal soda, and is cheaper.

Of this solution one quart was put into forty gallons of water, which was then sprinkled over a field of worm-infested cotton in the usual way. It destroyed the worms, which were in strong force when the application was made, leaving the plants uninjured to any extent worth naming. Several similar tests were made, all with uniform success. Forty gallons were found amply sufficient to go over an acre of cotton of ordinary growth.

In arsenic prepared as above we have a remedy with which we can save our crops from the cotton worm at a cost for the poison at less than one cent and a half per acre. To this there must be added in the final footing up of all outlays, the further cost of preparation and application. And as to the cost of the application, it is no greater than that of any other liquid remedy; indeed it should not be so great owing to the fact that the liquid is a perfect solution, and therefore does not require the agitation necessary to keep in suspension the insoluble poisons, such as London purple and Paris green. The extra cost of preparing the saturated solution of arsenic might be put down as a very small item; but we think this is more than offset by the advantages of having a perfect solution at the application, made in a moment, without the necessity of stirring and "gauming" for an hour or so with some kind of coloring matter, "daubing" up one's clothes and everything else around after a manner that could scarcely be considered entirely agreeable. Nothing of this kind in preparing the arsenic for the cotton field—you pour a quart of clear solution into the bunghole of a barrel containing forty gallons of water, and all is ready. And then, as to the saturated solution, since it will keep an indfinite length of time it may be made at odd spells when there is nothing else in particular to do.

We are aware that a strong prejudice exists against the use of arsenic as an insecticide, the prejudice growing out of the mere fact, doubtless, that arsenic is well known by name as a deadly poison. Many persons who use London purple or Paris green upon their cotton without hesitation, could not be induced to use "arsenic" under any consideration. Nothing was ever more foolish. The three remedies are really the same, for the agent in both of the other articles named qualifying them to destroy the cotton worm is arsenic and nothing else. Remove the arsenic from them and they would be no more effectual as insecticides than powdered chalk or common road dust. There is no more danger attending the handling of pure arsenic than there is in handling either London purple or Paris green.

The planter who uses arsenic as an insecticide, preparing it in advance, as suggested should have a good whisky or oil barrel for containing his solution until wanted. This might be painted some bright color to strongly distinguish it from all other barrels on the place, and it would be well to have the word 'Arsenic' or 'Poison' painted (not daubed) in large plain letters upon its side. With such precaution as this, and keeping the barrel well bunged and out of the way of small children and livestock there could certainly be no attendant danger.

The rule which we have given for preparing the second or diluted solution might not hold good in every instance, on account of variation in the quality of arsenic, though we do not know that there is any very great variation; certainly there must be little danger of adulteration, for an article so cheap would scarcely be looked upon as holding out many inducements for anything of that kind. A good and safe way to set this of thing all right—one that every planter will understand—is to make small tests in advance of the general application as follows:

With some small vessel, as a tablespoon, put together one hundred and sixty measures of water and one measure of the saturated solution of arsenic. This gives the proportion of one quart of saturated solution to forty gallons of water. Sprinkle this thoroughly over an average hill of cotton and wait a day or so for results, doing it before the worms have put in a destructive appearance, of course. If no sign is left upon the plants the mixture is not strong enough and you must repeat the experiment with a little larger proportion of the saturated solution. If, on the other hand, the plants show the leaves considerably scorched and damaged, the diluted solution is too strong, and you must repeat with a reduced proportion of the saturated solution, measuring with great care, however, so that you will be able to come exactly at the extent of addition or reduction when you make your diluted solution on a larger scale. If, after your application, you find the leaves showing only an extremely slight mark or scorch—an occasional leaf curled a little at the edges, perhaps, and a small brownish or "piebald" spot here and there on some of their interiors—your dilluted solution is just right. These very slight scorches are what you want to see—while they will not damage your crop in the least, they will assure you that you are giving the worms a dose sufficiently strong to make a rapid and thorough finish of their work as cotton destroyers. With your solution at this strength you need have no fear of injuring your plants, put it on as you may; for, unlike a liquid merely holding an insoluble poison in suspension, every drop applied is the same. In case of a suspended poison a want of suitable agitation is apt to render the application too weak, and when the vessel containing it is approaching to emptiness, it is apt to be too strong, possibly to such an extent as to work serious damage to the plants. With the arsenic no agitation is necessary, and the first pint drawn from the vessel differs in not a single particular from the last.

A good deal might be said with reference to the different means of applying these liquid poisons now in vogue among planters, but we can give that part of the subject only a passing touch at present. There are many patent "sprinkling machines" now on the market and to be had in Southern cities, and some of them seem to work very well, though we have not given to any of them sufficient study to enable us to venture an opinion as to merits or demerits. The main thing is to get the poison over the plants in as fine a spray as possible, and, of course, at the least possible cost. One of the implements in most general use is a common force pump rigged to a barrel containing the liquid and provided with some kind of nozzle calculated to throw the liquid broadcast when it is forced through it. The barrel is hauled over the patch on a two-horse cart or wagon, which "straddles" a row of cotton as it goes. Of course the cotton is bent down under the axle of the vehicle, but this rarely damages it, as it soon rises again to its original perpendicular. In many localities a cheap tin force pump, made expressly for the purpose, is for sale at the hardware stores. The common garden "fountain pump" may be made to answer very well where the work is not on too large a scale; and we have known several acres to be saved by spraying with a common hand sprinkling pot, but this was hard work and tedious.

SOMETHING ON IRRIGATION.

The Florida Agriculturist tells us that Judge Speer of Oakland, Orange county, Fla., is completely irrigating 100 acres devoted to truck farming by lifting water from a lake with a simple steam vacuum pump. The pump is one going into quite general use in that state for irrigation purposes, and for throwing water from drainage canals running through low lands that have been reclaimed from the swamps by ditching. It is a pump with greater capacity than any other pump known, all things considered. There is no engine, and very little of anything else that could be called machinery.

After seeing this in the Agriculturist we wrote to an acquaintance in Orange county, Fla., for further information. He replied that the statement referred to was entirely correct. The pump is simplicity itself, in consequence of which no engineer is necessary—the fireman to keep up steam is the only requirement. You merely fire up and turn on steam—this is all there is to do. On this account the pump is comparatively inexpensive both as to original cost and as to operation. It can be arranged to lift water 200 feet.

We did not get the name of this vacuum pump now being employed in Florida, and would not pretend to hold out the idea that it is not one in common use in other localities. The one now being worked by Judge Speer raises 2,961.120 gallons of water in twenty-four hours with a steam pressure of less than ten pounds to the inch. The cost of running it is covered by the small quantity of fuel necessary and the employment of one ordinary hand. The results, even in that region of heavy rainfall, are highly satisfactory to Judge Speer, now after two years of practical demonstration.

In a former article we gave it as our opinion that water lifted by steam from the Trinity and other similar streams in Texas, to be employed in irrigating the adjacent second bottoms above overflow, might be made to pay. These foregoing showings place the thing upon a basis admitting of calculations. Of course irrigation pays best where water can be directly run upon the lands from artesian wells, or from streams flowing at a higher level than the lands under cultivation, yet with these lights, as now before us, it would appear that water raised by steam can be made to pay, especially in truck farming. If it can be made to pay in Forida it could certainly be made to pay here where an artificial water supply is undoubtedly much more needed than there.

A correct system of irrigation in agriculture means land giving to crops the full benefit of all the plant food there is in it. Plants can take the food that sustains and develops them only as a solution in water. The richest soil ever handled by the chemist is, so far as concerns plants, simply poverty itself in time of drouth. In such time clean quartz sand or pure ground glass is its equal in every respect. On the moment when a soil becomes "dried out," as we say, the plant set in it enters upon a period of starvation, and, like an animal, begins the consumption of its own substance. In other words, it begins "falling off," and as a consequence, when the rains finally come and supply the needed moisture to enable it to resume feeding, a considerable time is required to bring it back to its normal condition—in very many cases that condition has scarcely been reached ere another period of drouth is on, leaving the plant to starve back without having acquired any particular gain. Plants and animals are more alike in this regard than most persons would suppose. Say you pen a pig and feed it into a thrifty condition, then starve it into extreme poverty, then feed it up again, then starve it again—what could you expect to make of it? A miserable lank and lean "scrub" at best. But if you supply it regularly along with all the food it needs you keep it continually on the gain until it is eventually developed into a fine animal. Just so with plants—the parallel is perfect.

Irrigation in agriculture means, furthermore, a certainty of heavy yields for each and every season to the fullest capacity of the soil. Of course this presumes the crop grown to be one suited to the climate in which an attempt is being made to grow it. We could not claim for irrigationthat it would make oranges a success in Iowa or cranberries a success in Texas, but any crop that we grow here at all can be well grown under a regular water supply.

Irrigation in agriculture means, additionally, a regular growing season for crops, extending from the latest spring frosts to the first heavy frosts of fall. Without it our seasons for many crops in the South are as short as are the seasons in Canada. We hasten to get our crops set early in spring to give them the benefit of what we call the "growing season." At the end of that season we harvest them and then leave the land lying idle to seed itself in noxious weeds until the next "growing season" has opened up with the following spring, drawing our supplies the while from California, or Colorado, or some other distant region where the people have forged ahead of us in an appreciation of the advantages of irrigation. This kind of thing is simply tantamount to running a good business on less than half time when we might just as well run it on full time. Under correct irrigation the entire frostless season is a growing season, and that portion of it now turned over to the weeds is the very best growing season of the year.

True there are many persons ever ready to tell us that our warm weather of summer is against many crops, "burning them up," etc., but this is a mistake. It is drouth that causes them to "burn up," and not heat. Give them as much moisture as they need and warm weather is favorable to them all the time. This position is clearly established in the fact that the most productive countries of the world are warmer in summer than are any regions of North America. Egypt is one of these, Peru another, and so on. Of course it is unnecessary to add that their agricultural operations are under complete systems of irrigation.

A correct summing together of all this cannot do otherwise than leave every fair-seeing person to recognize the fact that irrigation in agriculture, especially for Texas, means a heavy and prosperous population in the irrigatable regions, and the establishment of countless paying industries now scarcely so much as dreamed of by such as have not devoted to the matter a due amount of careful and intelligent thought. The old bugbear of over-production may attempt to elbow itself in, but as stated by us on a former occasion, there can be no such thing as over-production, provided we manage to produce cheaply. Irrigation would enable us to do this by making constantly available to crops our great natural wealth of plant food, and by extending our producing seasons from 100 to 150 per cent longer than they are at present. If we can cheaply produce more than we need for home consumption, there are millions of people living in other less favored regions who are ready to take all our surplus. Should there arise certain contingencies against our shipping direct to them all our surplus products so fast as produced, we can do like they do in other irrigated regions—call the mechanic to our aid and prepare the products to keep for shipment at leisure and on order as needed.

Most of these points have already been made by us in former articles, but we here wring them in again as a reminder for the person who may feel disposed to make calculations on whether or not it would pay to irrigate in Texas by lifting water from our streams through the agency of steam. It will be seen that we have mainly had in mind such crops as are not now generally raised on a large scale in our state, but which are extremely profitable to the regions at present raising them under irrigation. In making that calculation it would be well to also take into consideration our most common crops, as cotton, corn, etc. Irrigation would make these entirely regular; that is, full and the same for every season; while at the same time, its effects upon our natural plant-food would render it entirely safe for us to put them down as fully doubling their present yield on an every-year average.

TEXAS AND PEACHES.

Colman's Rural World of St. Louis contains an article from Governor W. Furnas of Nebraska which says: "For five or six years we have been without peaches to any extent worth naming. The winters past have been severe enough to scorch the trees badly, and but little replanting is being done."

In this paragraph lies a hint well worthy of consideration by the people of Texas. Winter never scorches the peach trees here and in times past it very seldom affected the fruit. This season we have plenty of peaches, but of cource we are not so fortunate every year, of late. When a worse fortune happens to fall upon us it does not come as the result of tree scorching, but of the new and unsuited varieties recently brought into our state. In those earlier days when peaches were abundant every year, want of advantageous transportation facilities caused those peaches to be of no value to us beyond the home consumption value, consequently we raised only what we needed for home use. On this account we took no special interest in peach culture. The case is quite different now. From very many points we can ship peaches as far as we like, and those regions where winter scorches out the peach trees would like to have our fruit. If we go back to the old Spanish strains that never failed us, throw them into good varieties by selection, and then produce them in large quantities we shall soon be found coming entirely to the front as a peach country. We'll be able to find ready market for all our product. Our regular crops will soon cause people at a distance to depend upon us for their supplies. Such a course would open up an immense industry for Texas in a line not now cutting any particular figure. Of our ability to produce the old style peaches regularly and profitably there can be no question whatever. The present will be a favorable season for chosing good varieties among the old Spanish seedlidgs.

KEROSENE EMULSION.

Our attention has been called to a small scale insect infesting the peach trees in portions of Texas, and doing more or less damage. As yet we have not been able to positively dentify it as to species. If the reader has it on his trees he will find it as little oval shells sticking tightly to the small limbs, the flat side down. They are not more than one tenth of an inch in diameter the long way. These are the females of the insect and a little later will be full of eggs. In this case the shell becomes a nest from which the eggs will eventually hatch, leaving it sticking dead and dry upon the limb. The males of the insect are of quite a different character, being provided with wings which enable them to fly from tree to tree. The trees are injured by the insects in their drawing the sap from the small branches.

The remedy for this little pest lies in kerosene emulsion, which is referred to by Professor A. S. Packard of the United States entomological commission, in his recently published bulletin No. 7 as follows:

The ease and practicability of emulsifying and diluting kerosene to any desired strength has been so fully demonstrated in the course of the work of the division of entomology under my direction, that there is no longer need of attempting its use pure. * * * The formula for the preparation of kerosene emulsion ordinarily recommended by me is the one originated by my former agent, Mr. H. G. Hubbard, in his work against the orange insects. It is as follows:

Kerosene	2 gallons.
Common soap	½ pound.
Water	1 gallon.

Dissolve the soap in the water by heating and add the solution boiling hot to the kerosene and churn the mixture by means of a force-pump and spray-nozzle for five minutes. The emulsion, if perfect, forms a cream which thickens on cooling and should adhere without oiliness to the surface of glass. Dilute before using, one part of the emulsion with nine parts of cold water. The above formula makes three gallons of emulsion and when diluted gives thirty gallons of wash.

In case where a person does not happen to have the force-pump and spray-nozzle, the emulsion can be made as well by churning the mixture in a common churn, or by any other kind of rapid agitation most convenient.

This diluted emulsion must be sprayed over the infected tree by means of a force-pump and nozzle or a garden syringe. It will put an end to every scale insect upon which a particle of it alights. It is also equally as effective as a remedy for the plum tree aphis, or for an aphis (plant louse) of any kind. Will not at all injure the trees.

OUR CORRESPONDENTS.

This department is devoted to answering such questions as may be asked by our subscribers, which may be of general information. Inquiries of personal character that require answer by mail should always have stamp inclosed. Please give full name and postoffice address in addition to any such signature as "Subscriber," or "A. G. D," not for publication. If against the will of the writer, but to admit of direct communication should such a thing be deemed necessary. Address as directed at head of this page.

A TALK ON GYPSUM.

I am not exactly what might be termed a practical agriculturist, yet I read the agricultural department of THE GAZETTE regularly and with much pleasure. Unlike most aaricultural literature now going the rounds I find its contents are fresh and never tiresome. Then I well know that the great and brilliant future of Texas that we are all talking about must spring from her agriculture. Agricultural prosperity is a permanent prosperity. It is the very bedrock of all other forms of permanent prosperity. This fact of itself ought to be enough to lead every thinking well-wisher of Texas into an appreciation of the efforts now being made by the Fort Worth GAZETTE, through its excellent agricultural department, to level off that bed-rock and fit it for taking on the great structures that it must eventually sustain.

I was much interested in your remarks on the uses of gypsum, appearing in last Sunday's GAZETTE as a reply to a letter from Mr. Jas. F. Warren of Pecos City. You speak of gypsum as a valuable fertilizing agent, and intimate that the day may soon come which will find it extensively used in the South. There are many very rich gypsum deposits in Texas, and might you not contribute to its earlier utilization by giving us an article telling all about gypsum, or land plaster, as a fertilizer? It strikes me that way, and if you can look upon the suggestion as worthy of your action I, with others, would much like to hear from you. REGULAR READER.

Ward county, Tex.

Mr. John M. Stahl of Quincy, Ill., an agricultural writer of much note, and a first-class authority to draw upon in this case, says gypsum, or "land plaster," is not only a manure hightly advantageous to crops, but a manure gatherer as well. It not only gives to the crop that part of itself which is food for the plants, but it also gathers plant food from the atmosphere and soil—much more than is contained naturally within itself. And yet land plaster, which is simply ground gypsum, is to a great extent, a non-appreciated substance, for the reason that so many fail to recognize the very important office it is capable of filling in agriculture. There are hosts ready to even deny that it is a manurial agent at all. That it has little direct value as a manure is perhaps correct. This is shown by the fact that about a bushel to the acre gives as good returns as a larger quantity; if more is sown it is wasted. Hence whatever of itself is given directly to the plant is of such a character that but little is needed; it must be some important element of which the plant uses but little. Nor is it correct to say that it is only a stimulant; for a hundred years' trial has shown that it permanently improves the soil, if the vegetation produced by it is not removed from the land. Nor can the benefit result from its effect upon the mechanical condition of the ground. The small quantity used could have no such effect upon the mechanical condition of the soil as would produce the increase in the crop that an application of land plaster causes, and if its good effects were due to its action upon the mechanical condition of the soil, then a larger quantity would give better results, which is not the case. The rather airy theory that it acts as the saliva or gastric juice of the plant has even yet less foundation, for if this were true an overdose would prove hurtful, which is not the case.

What explanation, then, have we of the phenomenal results common from the employment of land plaster as a fertilizer? asks Mr. Stahl, Phenomenal is the correct word, for Leibig found that four pounds of gypsum or land plaster produced 100 pounds of clover. We know what part ammonia plays in plant growth; we also know that there is free ammonia in the atmosphere and some in the soil, and the problem is how to gather it and hold it for the growing plants. Gypsum is a compound of sulphuric acid and lime. Ammonia has a stronger chemical affinity for sulphur than lime has. The result is that the ammonia dissolves the gypsum and unites with the sulphur, and the result of this action is two new compounds—sulphate ammonia, a very powerful manure, and carbonate of lime. Such must be the case. And this is further proven by the fact observed by Liebig and many others that the good effect of plaster is in no wise diminished by applying it to a soil having an abundance of lime; hence its good effects must be due rather to the action of the sulphuric acid, which could be, as it must be, only in furnishing sulphate of ammonia to the plant.

Here is something well worthy of ponderation at the hands of Texans. Generally speaking our soils are very rich as lime soils. They do not seem to need anything more in the way of lime, and, as a rule, they are not much in want of phosphoric acid. Land plaster does not appear to supply either of these, and yet it acts as a great increaser of crops, even on such lands as are ranked among our best lands in Texas. Strange as the thing may sound, it is a fertilizer with which to profitably fertilize fertile lands.

This peculiar showing, adds Mr. Stahl, explains why the action of land plaster is out of all proportion to the quantity used; why only a small quantity is needed. It is an ammonia supplying mineral. Everything points strongly to this theory all along, and we find the theory well nigh converted into a positive fact when we reflect that gypsum benefits no crops more than clover or field peas, and that no other crops more greedily feed upon ammonia.

Mr. Stahl thinks the people of the South will find it profitable to use plaster not only upon crops for green manuring, but for other crops. There is no better fertilizer for potatoes. It has a wonderful effect upon wheat, especially if sown in the spring, when the plant is weakened. Plaster sown on wheat, badly damaged by frost, in the spring will bring back at least five-fold. On many fields it is a splendid fertilizer for corn. It is usually given, next to ashes, as one of the fertilizers to be applied to tobacco, and many have found it profitable to apply it to cotton. It is comparatively so cheap that every farmer may well experiment with it, and few will find it unprofitable upon any soil for any crop.

Its power of absorbing that powerful and volatile fertilizer—ammonia—and holding it fast until it is to be given up to the growing crop, makes it a very valuable constituent of the compost. We often see a compost heap or manure pile giving off ammonia. This is apparent to our eyes as well as to our nose. The easiest and most effectual way to stop this escape of so valuable a substance is to sow plaster over the heap. It will absorb the escaping ammonia and hold it fast, while all the time gathering a further store from the atmosphere. Every man who composts manure, or who allows stable manure to accumulate, has need of gypsum.

Nature appears to have done everything in her power to give Texas a soil entirely perfect, so far as relates to plant production. In but two elements is there any deficiency. One of these is regular moisture and the other is ammonia. Neither of these could be placed as a perpetual component of the soil, so nature laid them away within our easy reach to be applied by ourselves as needed. The water she sealed up for us in artesian strata, and it would now seem the ammonia, or an agent for collecting it, she has banked subject to our draft, in the great gypsum deposits of our state. Really, when we come to look at it aright, there is something extremely remarkable in the general get-up of Texas.

If Mr. Stahl is correct in his statements with reference to gypsum (and we are satisfied he is), those immense gypsum deposits in the Pecos country ought to be claiming much attention just now. They may prove of entirely more value to Texas than her phosphate beds are proving to Florida. Who knows?

BASKET WORMS ON THE ROSE.

Some very strange insect, or something else, is ruining the rose bushes in my yard. I send you a limb showing the trouble. You will see that the leaves are covered with small spots that look like scorches with a hot iron, and that sticking about over the leaves are brownish buds about the size of a rice grain. I find that these singular buds move from place to place, and therefore am led to the conclusion that they must be some kind of insect. Can you explain the case through THE GAZETTE and give me a remedy for the trouble?

Fort Worth, Tex. A LADY.

In the Sunday GAZETTE of the 10th instant, and the Weekly GAZETTE of last Thursday we described an insect known as the "basket worm"—the Thyridopteryx ephemeræformis of entomologists. The insect damaging your rose bushes is the same. While very young its little "basket" stands erect and looks like a small bud, but eventually when it has grown too heavy for the insect to longer hold it up it will fall over and hang down as described in the article referred to. While seeming to prefer cedar or arborvitæ, this insect will feed upon almost any character of growth. Its appearance in such great numbers on your rose bushes leads us to suspect that there is an infested cedar or arborvitæ tree in the same yard.

Spraying the plants with some kind of arsenical poison would destroy the insects. The kerosene emulsion referred to at another place on this page, would be apt to prove entirely effectual.

FRUITS AND JAPAN CLOVER.

I would like to supplement what Mr. J. C. Martin of Fort Worth says about apricots, cherries, etc., with the statement that I have on my place the golden apricot, the English morillo cherry, the Bartlett pear, the Kieffer pear and the Le Conte pear. All are growing splendidly and promising for this year a full crop of fruit. Growing in my garden I have the Crandal currant, but the late spring hail destroyed its bloom. Will report on my success in future.

Can you tell me through THE GAZETTE whether or not Japan clover is grown in Texas, and if grown, with what success?

Willow Point, Tex. J. H. ETTER.

Shall be glad to have your promised report. The course pursued by Mr. Martin and yourself is the proper course to pursue. Telling of what we have and what we are able to do is worth more than whole volumes of what we might possibly do under favorable circumstances.

While Japan clover (Lespedeza striata), is now growing in many paris of Texas, we cannot say positively that any Texan has yet given it attention as a crop. The agricultural experiment station at College Station appears to have been experimenting with it. In due time it will have spread by the roadside and on old fields all over the state. It has done this for all the lower states east of the Mississippi river, and it seems to be moving its "star of empire" westward, along with the "sneeze weed" and other unprofitable growths. From the much that has been said in its praise one ought to consider it is a poor Tray in bad company. Possibly so, though our own experience with it in another state would not warrant us in devoting any very large proportion of our treasure to a hastening of its coming.

THE PLUM TREE APHIS.

To-day I send you a small branch from my wild goose plum tree, the leaves on which, as you will see, are literally loaded with minute insects. There appears to be two kinds of them—one green and wingless and the other black and winged. They are causing the leaves to curl up and die, and I fear they will entirely ruin my tree. Please tell me through THE GAZETTE what you know of the insects and whether or not there is any way of destroying them. RURALIST.

Tarrant county, Tex.

It is the plum tree aphis, more commonly called the "plum tree plant louse." Entomologists have affixed to it Aphis pruni-foliæ as a scientific name. But one species is represented, the black specimens with wings being the males and the green and wingless specimens being the females. They usually cluster on the undersides of the leaves, which they puncture for the purpose of sucking the sap. For a remedy see in another place an article on kerosene emulsion. We know of no better remedy, nor one more simple.

COOKED COTTON SEED.

I have seen a good deal in THE GAZETTE about cooked cotton seed for stock. Do you honestly regard cooking the seed as of any advantage, or is it merely the dodge of some fellow who has a patent right for sale?

Dallas, Tex. QUIZ.

In many cases cooking improves cotton seed for feeding purposes, doubtless. There is no patent on any process of cooking that we know of, and if there was it could scarcely be made to hold, owing to the fact that the thing is nothing at all new. Every day it is blown through the papers as something new, and possibly it is to the blowers, but yet it is not new all the same. In 1876 the now late Dr. M. W. Philips of Mississippi, wrote to the Country Gentleman as follows—the item is taken from our scrap book:

A few years ago our professor of Greek, a native of this state, was chatting with me on his back porch, when he called my attention to some half dozen fine fat oxen (it was the month of March) passing to the woods, and asked my opinion of their condition. I replied that either would make better beef than our market afforded. He then said that they had had no other food for three or four months than the cooked cotton seed, as I had directed. His supply of hay and bran gave out perhaps, in November. The cows were in milk.

OUR POULTRY ADVANTAGES.

I am taking a Northern poultry journal but find that its teachings do not always apply to Texas. We have advantages here that they do not enjoy at the North. For instance, the publication I take lays great weight on the importance of animal food for fowls as an indispensable. Here we don't need much in that line. Where the ground is frozen hard for months in the year it may be necessary to hustle round in search of a substitute for the natural food of the fowl, locked up in the ice-bound earth, but there is no such thing operating in Texas. Here lively bugs, leather and succulent, and nutritious greens abound more or less at all seasons, ready and ready to be offered up as a living sacrifice on the altar of thoroughbred poultry.

This is one of our advantages for poultry raising in Texas—our pure and comparatively dry atmosphere is another. For my own part I regard Texas as the finest poultry country in the world, and yet strange as it may seem, our people ship a large proportion of the poultry and eggs consumed by them from those less favored regions at the far North. How is this? C. R. P.

Waco, Tex.

We must confess that the question put by our correspondent is one entirely too tough for us to tackle with any hope of offering a reasonable answer.

IRRIGATION WILL PAY.

I have been irrigating this season in accordance with your directions as published in THE GAZETTE. My irrigated garden is just twelve by sixteen feet in size, but it is trenched off in the regular way, and the needed water is supplied once a week in the trenches. You never saw anything finer than is the truck on that little plot. My regular garden is much larger, and though equally as well cultivated in every respect it does not compare in excellence to the little irrigated plat. C. R. P.

Waco, Tex.

We have had our eye on a little plat of land in Fort Worth under a pretty fair system of irrigation from a hydrant. In it are new Irish potatoes two feet high, squashes about ready to bloom, tomatoes ditto and garden peas—well the peas have already gone the way of the kitchen. No other garden truck that we have seen looks anything like as fine, proving beyond question that there are great advantages to be derived from a regular water supply to crops.

THE FURMAN FORMULA.

Please give me through THE GAZETTE the formula employed in making the celebrated Furman fertilizer so extensively used in Georgia and Alabama. Is it patented? Thanks for other particulars.

Galveston, Tex. B. L. WINTER.

The so-called Furman fertilizer was brought to public notice about 1879, by Hon. Farish Furman of Georgia, who by its use had grown heavy crops on lands badly worn and exhausted through persistent croppings. Following is the formula employed in its manufacture:

Whole cotton seed	750 lbs
Superphosphate	300 "
Kainet	200 "
Good stable manure	750 "

Mix well together and keep moist in bulk until the cotton seed has undergone partial decomposition. In case cotton seed meal is used instead of the whole cotton seed, reduce the weight fifty pounds and add fifty pounds to the kainet.

The success achieved by Mr. Furman with this compound led to the establishment of a factory for the preparation of the fertilizer. Large quantities of the fertilizer were shipped from the factory, but we believe it is not now running. Mr. Furman would not allow his formula to be patented, and its simplicity enabling any one to manufacture the fertilizer for himself eventually killed the factory.

THE BEST COTTON LANDS.

Will you kindly point out through THE GAZETTE where lie in considerable area the very best cotton lands of North America?

Weatherford, Tex. M.

Mr. Joseph B. Lyman has in his book on cotton culture a map which locates the very best cotton lands as follows:

A narrow strip along the Savannah river in Georgia; a considerable area in Alabama and Mississippi known as the black prairies; a some larger area extending along the Mississippi river from Baton Rouge, La., to the Tennessee line; a narrow strip running along the south side of Red river, from its mouth to the Arkansas line, and a great area in Texas (the greatest of all), reaching northeast and southwest from the Sabine river to the Colorado, and north and south from about the head of Trinity bay to the neighborhood of Waco. The area is about three times as long northeast and southwest as it is wide north and south.

POPULAR SCIENCE.

THE HEALTHFULNESS OF TEXAS EXPLAINED.

Use Plenty of Slacked Lime—To Change the Color of Flowers—How to Make a Bed—The Science of Frying.

Dr. M. G. Elzey, in his popular papers on "Applied Science," states that dampness is unfavorable to health and destructive to life. This, he says, is not merely a fact within professional knowledge, but it is universally known to be true. In winter, where weather is cold and damp there is a great increase of mortality from some well-known and very fatal diseases. In summer and early autumn there is, in regions hot and damp, a general prevalence of diarrheal, dysenteric, billious, typhoid and malarial diseases. Dry seasons are healthy without regard to the time of year in which they occur. Localities which have damp atmosphere are unhealthy; those which have dry atmosphere are healthy. A water-logged soil is known to be unsafe as a dwelling place. Localities where the lead of the ground water is near the surface are never healthy places of abode, but where the ground water lead is at a considerable depth is the best place to choose for the location of a residence.

* * *

The foregoing clearly explains the extreme healthfulness of Northern Texas, and eespecially that portion of the state known as the grand prairie formation. Here we have no damp atmosphere to speak of, at any season. It may be raining out of doors and yet the "wash" hung up in the house will dry as rapidly as it would in the sunshine of many other localities. Then our natural and peculiar underdrain-